Photo by Suomen Hyötytuuli

AKER ARCTIC TECHNOLOGY

Offshore wind power challenges in ice

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Artic Passion Seminar

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Aker Arctic
The Ice Technology Partner

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- Offshore wind turbine foundation model tests

Offshore wind potential in the Baltic

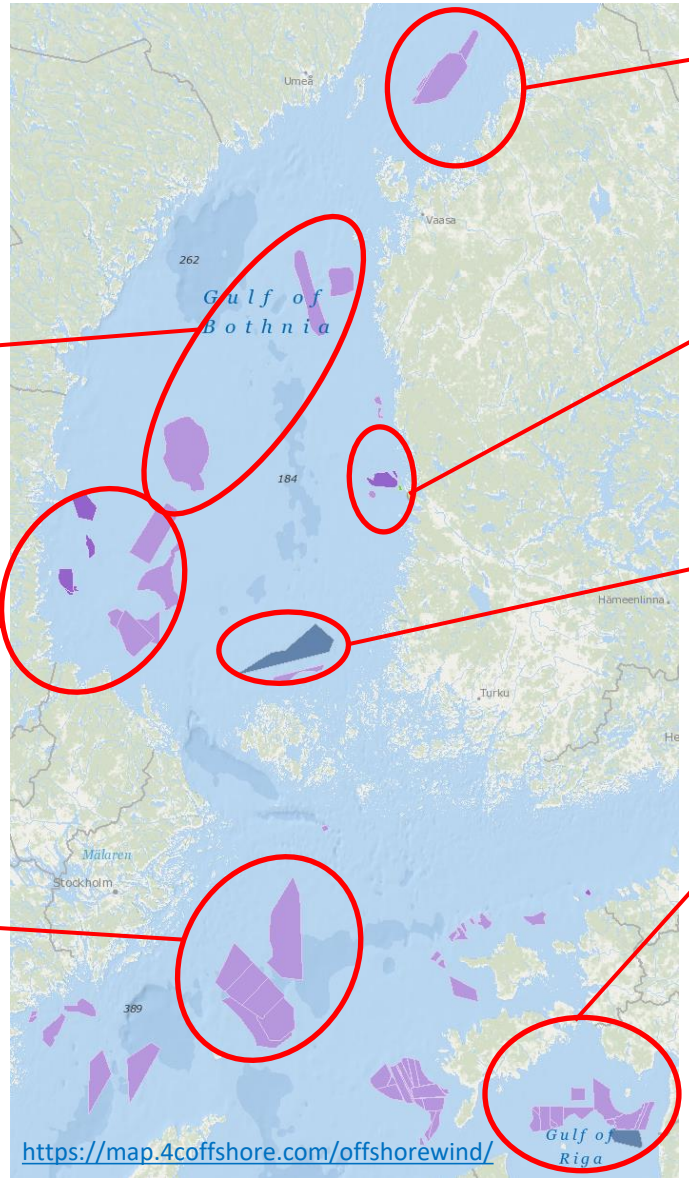
~ Number of turbines
Northern Baltic Sea region

TOTAL 300 - 330

TOTAL 1085 - 1210

TOTAL 850 - 1000

All total: ≈ 3350 – 4000



https://map.4coffshore.com/offshorewind/

TOTAL 430 - 460

TOTAL 200 - 225

TOTAL 475-860

TOTAL 895 - 1170

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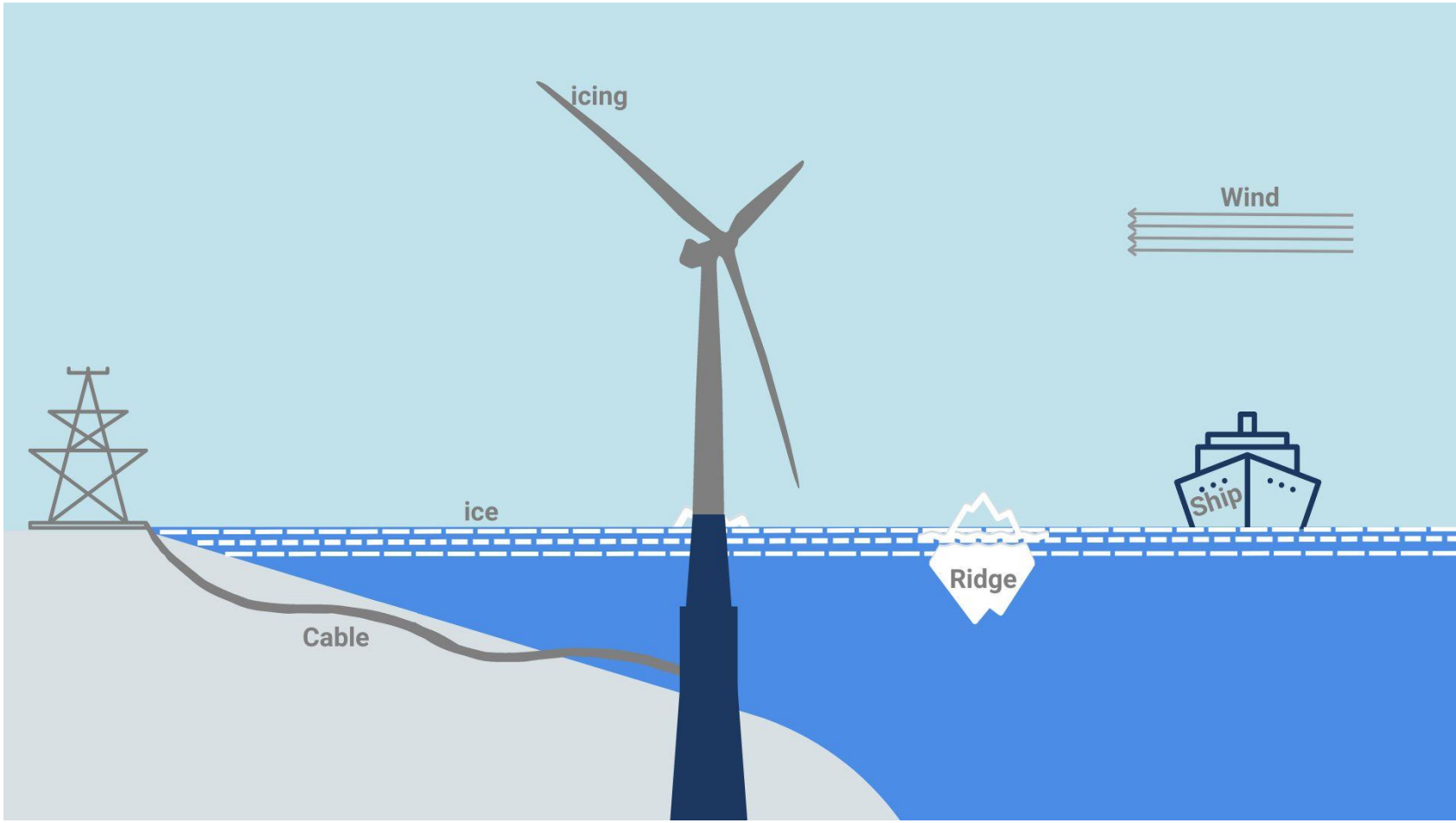
Ice related challenges

- Ice drift
  - Wind & current
  - Winter Traffic
- Ice loads on foundations
  - Global forces
  - Local pressure
  - Ice induced vibrations
- Service operations during winter
- Icing – Winterization/de-icing
- Cable ice protection
- Limited installation season
  - Installation during easy ice season ?
- Logistics are limited to summer season ?

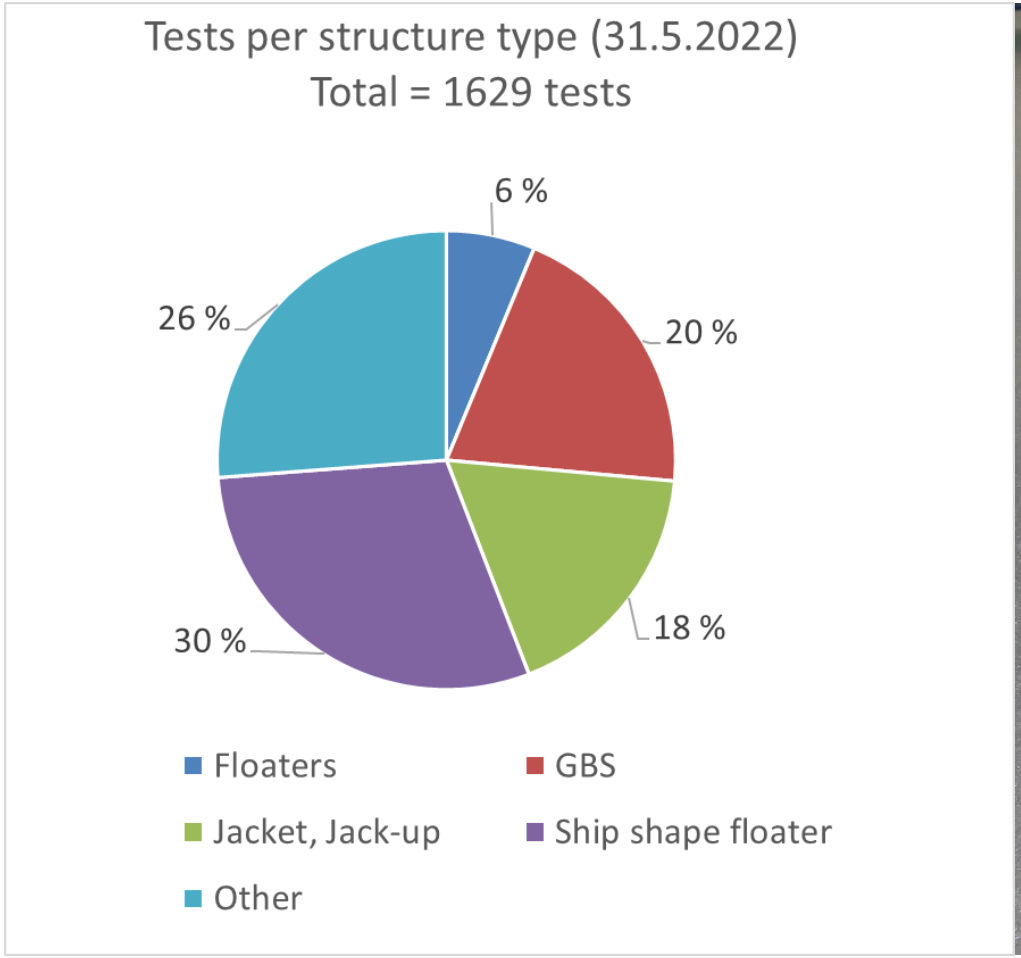


Aker Arctic role in offshore wind projects

- Ice conditions assessment
- Offshore wind foundations design consultation
- Ship concepts and fleet definitions
- Marine Logistics
- Ice management
- Ice model test (ex: foundations, substations, ships)

Photo by Irfan Alijagic on Unsplash

Model test – Offshore structures



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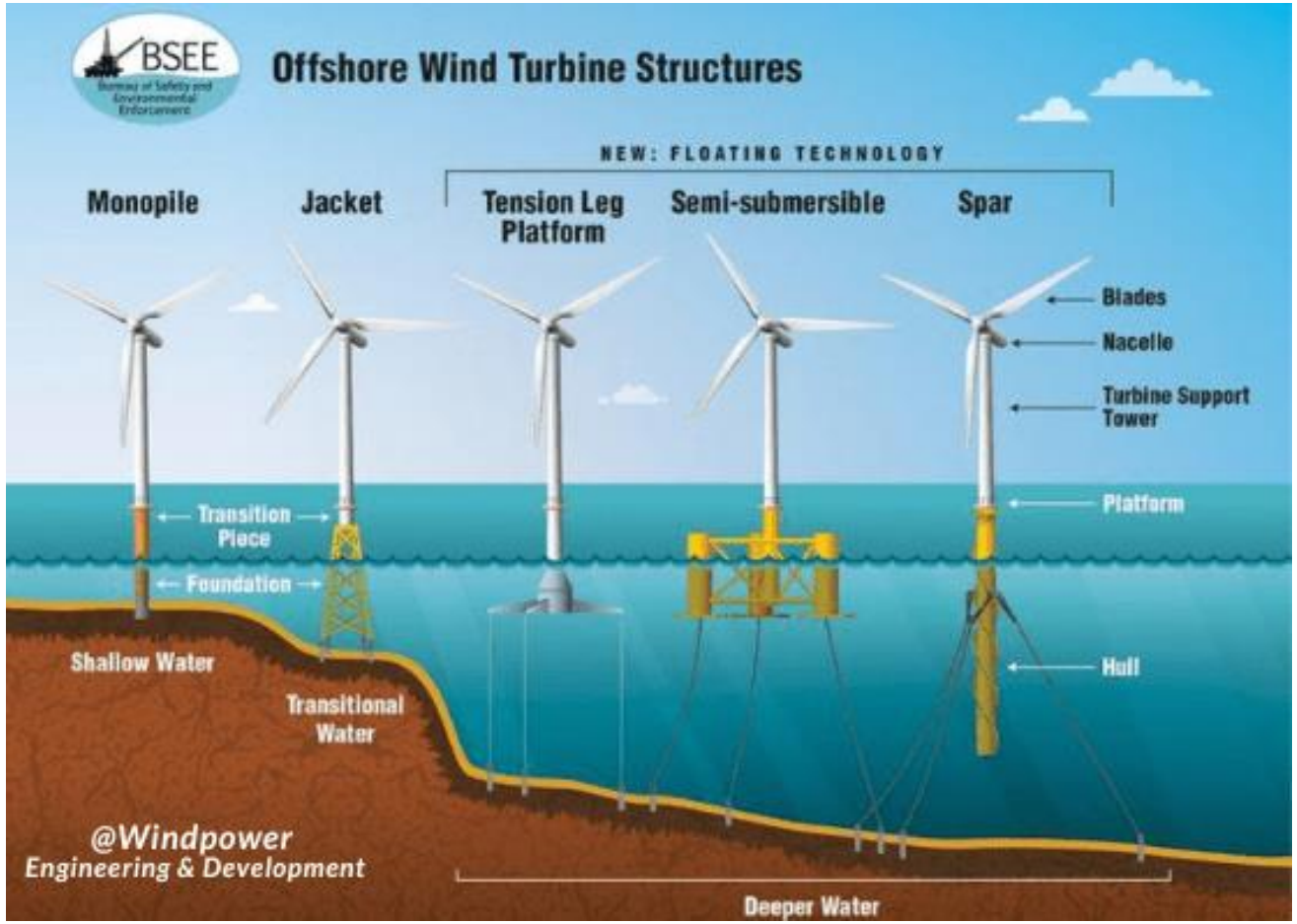
How to choose a foundation?

Key parameters:

- Seabed sediment structure
- Water depth
- Wave load
- Ice load



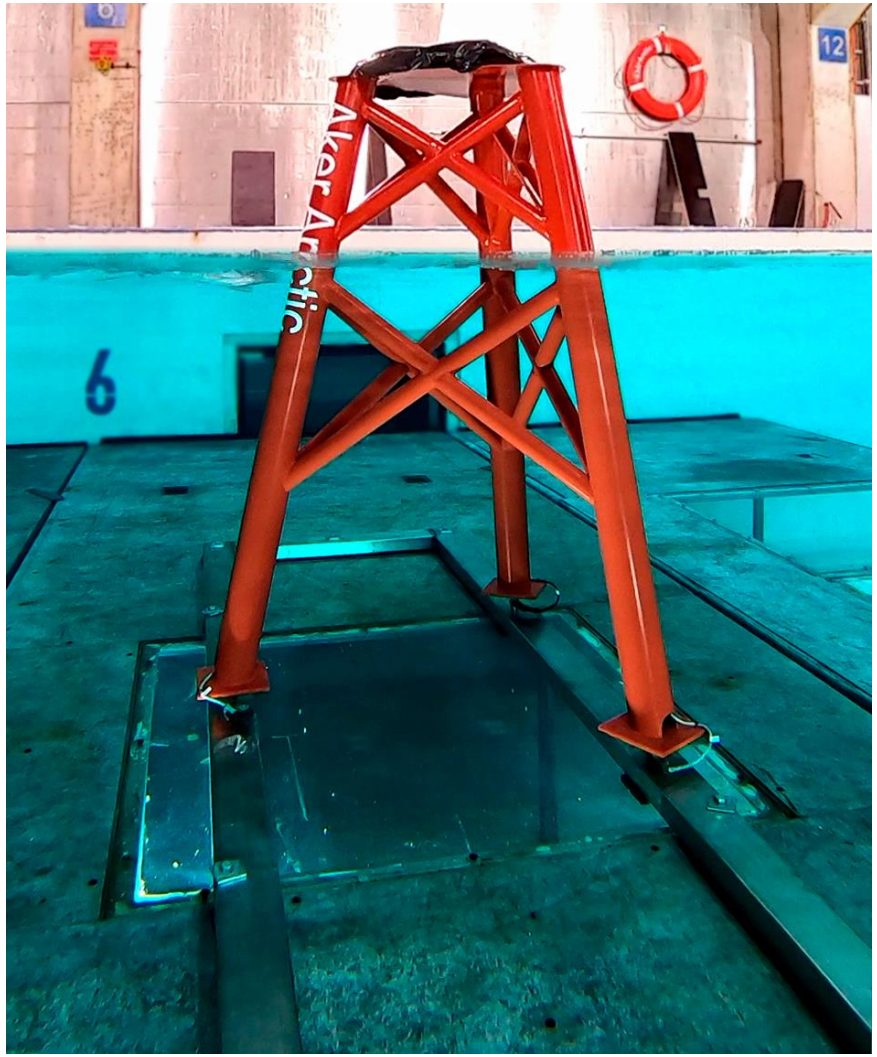
https://www.windedition.com/introducing-different-types-of-offshore-wind-turbine-foundations-fixed-and-floating/

Offshore wind turbine foundation model test

- Scale factor (1:20)
  - Ice thickness
  - Water depth
  - Drift speed
- Ice loads are measured
- Observations: pile up around the structure

	Model scale (1:20)	Full scale
Ice thickness	25 mm	50 cm
Water depth	1.0 m	20 m
Ice drift speed*	34 mm/s	0.15 m/s
Structure height	1.4 m	28 m
Pipe-leg angle	77 °	77 °

*based on wind speed of 5-15 m/s on the Baltic Sea



Offshore wind turbine foundation model tests

- Practicalities for our model test
- 3 groups/3 views
  - Sea level
  - Underwater side
  - Underwater bottom

Thank you

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